Anadex

INSTALLATION AND OPERATING MANUAL

MODEL DP-8000 ALPHANUMERIC LINE PRINTER

S/N_____

UPDATED 1-22-79

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Anadex

CAUTION CAUTION CAUTION CAUTION

ALTHOUGH MANY TYPES OF RIBBONS ARE AVAILABLE ON STANDARD 0.5" UNDERWOOD SPOOLS, NOT ALL OF THESE RIBBONS ARE ACCEPTABLE FOR USE WITH THE MODEL DP-8000 PRINTER. RIBBONS USED WITH THE MODEL DP-8000 MUST BE DYE BASED AND MADE EXPRESSLY FOR DOT MATRIX TYPE PRINTERS. THESE RIBBONS CONTAIN THE LUBRICANTS NECESSARY FOR REASONABLE DOT MATRIX PRINT HEAD LIFE AND DO NOT CLOG THE PRINT HEAD. ADDITIONALLY, SOME RIBBONS AVAILABLE ON UNDERWOOD SPOOLS CONTAIN AN EYELET LOCATED NEAR EITHER END OF THE RIBBON SUPPLY. USE OF THIS TYPE OF RIBBON IN THE MODEL DP-8000 WILL CAUSE A CATASTROPHIC FAILURE WHEN THE PRINT HEAD CONTACTS THE EYELET. NATURALLY, USE OF THIS TYPE OF RIBBON WILL IMMEDIATELY VOID THE WARRANTY.

RIBBONS OF THE CORRECT TYPE FOR USE IN THE MODEL DP-8000 MAY BE PURCHASED FROM ANADEX INC. OR ANY OF OUR AUTHORIZED DISTRIBUTORS UNDER ANADEX PART NO. 2009-5014-00, INTENSE PURPLE (COLUMBIA RIBBON CO., P/N 8234-93449-L34).

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1.2 Introduction

The Anadex Model DP-8000 Alphanumeric Line Printer is a highly versatile, general purpose, dot matrix printer featuring EIA Std. RS232C, 20-60 ma Current Loop and Parallel Bit, Serial Character, Synchronous interfaces. Having all three interfaces available in a single model makes the DP-8000 compatible with most mini- and micro-computer systems currently available in the marketplace. Additionally, the optional 2048 character buffer storage register makes the Printer very attractive for use directly with computer peripherals, such as CRT Terminals.

The Printer accepts the complete 128 character USASCII code set--printing both upper and lower case bi-directionally at a speed of 84 lines per minute. A three-line buffer storage register accepts data at rates in excess of 1000 characters per second, using the synchronous interface. The data rate for the asynchronous interfaces is internally switch selectable from 110 through 9600 Baud.

Positive forms registration is provided by a heavy duty, sprocket feed mechanism. Form length and skip-over perforation distance are also internally switch selectable. Top of Form and eight programmable Vertical Tabs enhance the Printer's forms-handling capabilities.

II INSTALLATION

2. 1 Physical

Outline dimensions for the unit are given on the data sheet contained in Section I.

2. 1. 1 Unpacking and Receiving Inspection

Upon removing the Printer from its shipping carton, a visual inspection should be conducted to ascertain any damage which may have occurred during shipment. If no damage is evident, the following steps must be performed to prepare the Printer for operation.

a. Remove the Printer's cover by applying a slight outward pull on either side of the top half while simultaneously lifting upward. Locate and discard the packing material inside the Printer.

b. Install the ribbon supplied with the Printer (refer to Section 2. 1. 4 of the manual).

c. Install paper. Refer to Section 2. 1. 5 of the manual.

d. Ascertain the proper primary AC power source (mains) from the label located on the metal chassis at the rear of the Printer.

e. Replace the cover on the Printer.

THE PRINTER IS NOW READY FOR OPERATION.

2. 1. 2 Operating Site Selection

The Printer is designed to be normally used resting on a bench or table with paper access through the rear. However, an additional paper access slot through the bottom has been included for those applications which require pedestal mounting.

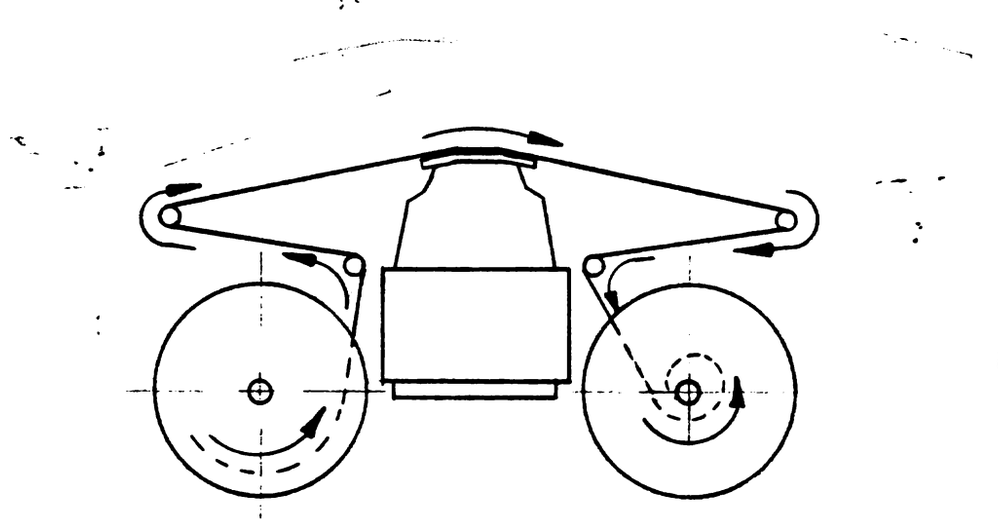
2. 1. 3 Ventilation

Proper operation in hostile environments necessitates proper air circulation around the unit to keep the ambient temperature within the limits specified on the data sheet.

2. 1. 4 Ribbon Installation

Remove the Printer's top cover by following the instructions in Section 2. 1. 1. Hold the two spools horizontally, one in each hand, so that ribbon running between the spools is on the side toward you (not on the far side).

Ribbon is now installed by placing the left spool in place on its ratchet gear and threading the ribbon across the face of the printhead, following the path depicted below. Once threaded, place the right spool in place on its ratchet gear and rotate counterclockwise to remove any slack in the loop. Replace the top cover.



2.1.5 Paper Installation

Paper may be installed with the top cover in place either through the slot in the bottom of the Printer or from the rear along the upper surface of the bottom plate of the print mechanism. The printhead must be at either the left- or right-home position when paper is installed in order to preclude the possibility of catching the ribbon when the paper is inserted.

Grip the paper hold-down spring on each sprocket wheel and pull out until the springs reach the click stop where they will remain clear of the sprocket wheels. Thread the paper through the selected path and up and around the sprocket wheels until the sprocket holes of the paper engage three or four sprocket pins on each side. Push the paper hold-down springs back into position against the sprocket wheels to hold the paper in place.

The silver lever, located on the right side of the mechanism directly above the paper feed, ratchet gear, is the manual, paper advance lever. Pulling the lever forward and releasing will advance the paper one line at a time. Pulling the lever forward and holding in this position unlocks the paper feed assembly and allows paper to be pulled through the mechanism.

When the Printer is first placed in operation or when changing to a new type of preprinted form, the position of the printed lines may require adjustment, vertically, with respect to the sprocket holes. The Printer's top cover must be removed to allow access to the following adjustment.

Loosen the large, black knob located on the right side of the mechanism directly below the paper feed, ratchet gear by turning counterclockwise. Moving this knob forward or backward will now move the paper vertically, with respect to the print position. Once adjusted for the particular form to be used, tighten in place by turning the knob clockwise.

2. 2 Electrical

2. 2. 1 Power Connection

The Printer is normally supplied for domestic shipment wired for 115 VAC, 60 Hz power and for European shipment wired for 230 VAC, 50 Hz power. Before connecting the Printer to a power source, ascertain the proper value from the label located on the metal chassis at the rear of the Printer.

2. 2. 2 Power Connector

The Printer is normally supplied with a separate detachable power cord with a three-prong grounding connector. Anadex part number is 6000-5000-03.

2. 2. 3 Signal Connections

All signal connections are available at the rear of the unit. See Pin Connection Tables 2. 1 and 2. 2 for details. NOTE: OBSERVE POLARITY OF INPUT SIGNALS.

2. 2. 4 System Ground

The COMMON terminal of the input connectors is the Zero reference for all power supply and signal voltages within the Printer. This COMMON circuit is isolated from the chassis (frame) ground of the Printer. The input terminals for the Current Loop Interface are completely isolated from both Circuit COMMON and Chassis Ground. It is recommended that the COMMON terminal, when applicable, be connected only to the Zero reference terminal of the signal source(s) to avoid "ground loop" effects. The difference of potential between the COMMON terminal and chassis ground should not exceed 200 VDC.

PIN CONNECTIONS, DP-8000

J2, SERIAL INTERFACE CONNECTOR

PIN		PIN	
1	Chassis Ground	14	
2		15	
3	Received Data (RS232C)	16	
4		17	
5		18	
6		19	
7	Circuit Common	20	Data Terminal Ready Output (RS232C)
8		21	
9		22	
10		23	
11	TTY 20/60 MA (+) Input	24	
12		25	TTY 20/60 MA (-) Input
13			

NOTES: All pins with no functional designation are No Connection.

WHEN USING EITHER SERIAL INTERFACE, NO CONNECTIONS MAY BE MADE TO THE PARALLEL INTERFACE CONNECTOR, J3.

Mating Connector: Anadex P. N. 2101-5029-00 (Connector)
Anadex P. N. 2101-5029-01 (Hood)
Cinch P. N. DB-25P (Connector)
Cinch P. N. DB-51226-1 (Hood)

PIN CONNECTIONS, DP-8000

J3, PARALLEL INTERFACE CONNECTORS

PIN		PIN	
1	Data Strobe (N)	19	Circuit Common (pair with 1)
2	Data Bit 1 (LSB)	20	Circuit Common (pair with 2)
3	Data Bit 2	21	Circuit Common (pair with 3)
4	Data Bit 3	22	Circuit Common (pair with 4)
5	Data Bit 4	23	Circuit Common (pair with 5)
6	Data Bit 5	24	Circuit Common (pair with 6)
7	Data Bit 6	25	Circuit Common (pair with 7)
8	Data Bit 7 (MSB)	26	Circuit Common (pair with 8)
9	Data Bit 8 (Parity)	27	Circuit Common (pair with 9)
10	Acknowledge Output (N)	28	Circuit Common (pair with 10)
11	Busy Output	29	Circuit Common (pair with 11)
12	Out of Paper Output	30	Circuit Common (pair with 31)
13	On Line Output	31	Input Prime (N)
14	Circuit Common	32	Fault Output (N)
15	No Connection	33	No Connection
16	Circuit Common	34	No Connection
17	Chassis Ground	35	No Connection
18	+ 5 VDC Bias	36	Input Busy

NOTES: Active low signals are specified by the the notation "(N)" after the signal name. Active high signals have no notation.

WHEN USING THE PARALLEL INTERFACE, INTERNAL SWITCHES S6-3 THRU S6-7 MUST BE IN THE "OFF" POSITION. REFER TO SECTION 3.7.

Input Prime (Pin 31) initializes the Printer. Refer to Section 3.6 for additional details.

+5 VDC Bias (Pin 18) is through a 2.7Ω, current limiting, series resistor.

Mating Connector: Anadex P.N. 2101-5001-01
Amphenol P.N. 57-30360

III OPERATION

3.1 Input Codes and Bit Format

The American Standard Code for Information Interchange (ASCII), accommodated by the DP-8000 Printer, is illustrated in Figure 3.1. Of the eight intelligence elements or bits, only the first seven are utilized as data or control bits--the eighth being used to provide an error detection feature called "parity." Thus, the code has 2^7 (128) available permutations. Of these combinations the 96 characters shown in Columns 2 through 7 are printed by the DP-8000.

NOTE: The parity feature of the code is normally checked only when the Serial Interface is used--and even then may be defeated (refer to Section 3.7). If used, and a character is received which contains a parity, framing, or overrun error, the character is replaced by the symbol ¿ in the printout.

Bits b_7 b_6 b_5					$0\,0\,0$	$0\,0\,1$	$0\,1\,0$	$0\,1\,1$	$1\,0\,0$	$1\,0\,1$	$1\,1\,0$	$1\,1\,1$
b_4	b_3	b_2	b_1	COLUMN / row	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	|
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

FIGURE 3.1

3.1.1 Non-Printing Character Codes

Of the 96 positions represented in Columns 2 through 7 of Figure 3.1, only the SP and DEL codes are non-printing in the Model DP-8000. Receipt of the SP (Space) code moves the print position one space to the right (i. e., leaves a blank space in the printout). Receipt of the DEL (Delete) code is totally ignored. Nothing is printed, and no space or blank is introduced in the printout.

3.1.2 Control Codes

The 32 positions represented by Columns 0 and 1 of Figure 3.1 contain non-printing Control Characters. Some of these Control Characters are recognized by the Model DP-8000, and the functions performed upon receipt of these characters are listed below. The Control Characters not listed perform no function in the Printer and will be totally ignored, if received.

3.1.3 Operating Modes

The following modes are selected by switches internal to the Printer (see Section 3.7).

3.1.3.1 Print Action Codes

Printable characters are accumulated in the Storage Buffer, but printing of a line is not initiated until a Print Action Code is encountered. The user may select one of two Print Action sets.

3.1.3.1.1 CR (Only)

The only Print Action Code is the ASCII Carriage Return Code. Paper vertical movement requires specific Line Feed, Form Feed, or Vertical Tab Codes following the Carriage Return. In this mode paper movement codes encountered after printable codes, but before the Action Code, are ignored.

3.1.3.1.2 CR or Movement

In this mode Carriage Return, Line Feed, Form Feed, and Vertical Tab are all valid Print Action Codes. When encountered in the Data Storage Buffer, these codes cause the printing of any printable codes preceding them, followed by paper movement. Carriage Return and Line Feed, each, cause the paper to move up one line. Form Feed and Vertical Tab cause the paper to move up one or more lines, as appropriate to their function.

3.1.3.2 Over-Length Lines

There are 80 character print positions on a line. Each printable character occupies one position--or two, if in the extended print mode. The user may select one of two responses when the Printer encounters a print line in the Storage Buffer, which would occupy more than 80 positions.

3.1.3.2.1 Truncate

In this mode characters that would occupy positions beyond the 80th are ignored. (They do not occupy space in the Storage Buffer.)

3.1.3.2.2 Wraparound

In this mode characters that would occupy positions beyond the 80th position are printed on the next line, left justified. If that line is filled, the printing continues on subsequent lines. NOTE: The data are counted as received. When the data would overflow a line, it is terminated as if a Print Action Code was received.

3. 1. 3. 2. 2 Wraparound (Cont'd)

Thus, that portion is considered complete and cannot be canceled. Only the final portion of such an overlength line requires a Print Action Code to be printed.

3. 1. 4 Multiple Line Feeds

3. 1. 4. 1 Form Feed

The ASCII Form Feed Code, when encountered as a valid Paper Movement Code (see 3. 1. 3), causes the paper to move vertically to the next Top-of-Form line position.

The Top of Form is determined by an initial reference position and the form length. The form length is set by internal switches (see 3. 7), and the initial reference position is that line position on the paper positioned at the printing head when power is applied to the Printer. This may be reestablished to the line at the printing head anytime the Printer is not in motion by pressing the Top-of-Form set switch on the front panel.

3. 1. 4. 2 Vertical Tabulation

The DP-8000 Printer can accept a maximum of eight vertical tab stops programmed through the communication interface. Receipt of the ASCII Code "DC2" clears all previously set tab stops. Receipt of a DC1 Code conditions the Printer to accept the next two characters as a line number to be set as a "Stop." These characters should be Decimal, ASCII Numbers, the more significant digit first.

3. 1. 4. 2 Vertical Tabulation (Cont'd)

For example: Receipt of "DC1," "0," "7" sets a tab stop at Line 7; receipt of "DC1," "2," "6" sets a tab stop at Line 26.

1. Top-of-Form is Line 0.
2. Tabs Stops must be sent in ascending, numerical order.
3. If a non-decimal ASCII character is sent in a line number, that tab is ignored.
4. Only the first eight, valid tabs are accepted; subsequent ones are ignored.
5. A tab stop at a line exceeding the form length is ignored.
6. A communication error (Parity, etc.) on any of the three characters in the sequence, aborts the sequence.

IMPORTANT: Tabs are set and cleared as soon as the control codes are received. If printing data is buffered and not yet printed when tabs are set or cleared, it affects the format of the yet unprinted lines.

When the ASCII "VT" Code occurs in the Data Storage Buffer after printable data, the Printer will execute sufficient line feeds to position the paper at the line number equal to the tab stop of next higher value than the line number at which the paper is positioned when the "VT" Code was recognized. If no higher value tab stop has been set, the paper will feed to the next Top of Form position.

3. 1. 4. 3 Multiple FF and VT Codes

If more than one Form Feed and/or Vertical Tab Code is entered into the Printer without intervening printable codes, only the first is accepted, and the subsequent ones are ignored.

3. 1. 4. 4 Skip-Over Perforation

The DP-8000 Printer provides an automatic Skip-Over Perforation. This causes a predetermined number of lines at the bottom of the form to be left unprinted (see Section 3. 7). Whenever the paper is advanced vertically into this area of the form, it is moved to the next Top-of-Form Position.

Control Character	Description And Function
LF	Line Feed--Advances the paper to the next printing position in a vertical direction.
VT	Vertical Tab--Advances the paper to the next predetermined Tab position in a vertical direction.
FF	Form Feed--Advances the paper to the next predetermined Top of Form position.
CR	Carriage Return--Initiates the printing of a line of previously stored characters and may advance paper vertically (depends on mode, Section 3.1.3.1).
SO	Shift Out--Instructs the Printer to print subsequently received characters in Double-Width format.
SI	Shift In--Instructs the Printer to print subsequently received characters in Single-Width format.
DC1	Device Control 1--Followed by a two-digit number, sets a Vertical Tab at the line position described by the two-digit number (see Section 3.1.4.2).
DC2	Device Control 2--Clears all previously set Vertical Tab positions.
CAN	Cancel--Deletes any previously entered characters from the data storage register, back to the end of the last terminated line. Also resets the character-width logic to the Single-Width format.

A time-out feature is incorporated, which performs the same function as receipt of the ASCII CAN code after ten seconds have elapsed. The timer is started upon receipt of a printable character and retriggered with receipt of each subsequent printable character. When the line is terminated by receipt of a CR code or any other acceptable method, the timer is turned off. Time out will not occur if the Printer is inhibiting the source from entering data (i. e. , Busy, etc).

3.2 Serial Interfaces

The DP-8000 Printer provides two, serial interfaces: one conforming to EIA RS232C, and the other is a 20/60 ma current loop input.

3.2.1 Closed Loop Operating Considerations

When operating at EIA RS232C, the DP-8000 Printer accepts data from the RECEIVED DATA Line and generates a DATA TERMINAL READY (DTR) Signal. The data source may begin transmission of a character any time that the DATA TERMINAL READY Signal is on.

In operation, this signal may switch off during a character transmission. That character is accepted by the Printer; and one more is accepted. Any subsequent transmissions, while DTR is off, are not accepted.

When operating into the current loop input, the DTR output is valid, although it is not transmitted at current loop levels.

3.2.2 Open Loop Operating Considerations

The Model DP-8000 Printer is normally operated in a Closed-Loop mode, whereby the transfer of data to the Printer can be controlled by the handshake signals provided. Under these circumstances, the flow of data is automatically regulated to a rate which does not exceed the printing throughput by more than the capacity of the integral data storage register.

Since applications may develop which require the Printer to be operated Open Loop, a short discussion of the operating limitations of the Printer is provided as a guide to aid the programmer in limiting data transfer rates externally. It is anticipated that these situations will occur most frequently when using the Current Loop Interface, as many Current Loop sources provide no means of accepting any Reverse Channel Signals.

The Printer can accept data at rates up to the maximum specified in Section 1 until the capacity of the integral data storage register is reached. This capacity is 254 positions in the standard Printer and 2302 positions when the Printer includes Option R.

3. 2. 2 Open Loop Operating Considerations (Cont'd)

For each data line entered, the number of data storage register positions occupied is equal to the number of printable characters and/or spaces in that line, plus three, additional positions. These three, additional positions are used to store any and all Control Characters (CR, LF, VT, FF, etc.) transmitted in conjunction with that line and for internal purposes. Therefore, if data is transferred in message blocks which do not exceed the capacity of the data storage register, no further limitations need be considered, other than allowing sufficient time between messages for previously entered data to be printed.

The actual printing throughput of the Model DP-8000 is 1. 4 lines per second nominal. This translates to each line of data being printed with one line feed cycle in 715 ms, regardless of the number of characters in the line. If the data transmitted to the Printer is of a random nature and it cannot be guaranteed that a message will not exceed the capacity of the data storage register or that sufficient time will elapse between messages, the data transfer rate must be limited to the printing throughput rate. This may be accomplished at the following Baud rates by ensuring that each line of data contains at least the minimum number of characters specified below. The minimum character count includes any Control Characters, such as CR/LF, which are transmitted in conjunction with the line. Lines which do not meet these minimum standards may be padded by the addition of NULL Codes.

BAUD RATE	MINIMUM CHARACTER COUNT PER LINE
110	8
150	12
300	24
600	48

3. 3 Input Data Format--Serial Interfaces

Figure 3. 2 illustrates the serial input data bit pulse train to the Model DP-8000 Printer. Each input character is encoded by a group of either 10 or 11 consecutive MARK or SPACE levels, each equal in time duration (units) which is fixed by the Baud rate. The duration "t" of these ten or eleven time units is equal to the reciprocal of the Baud rate.

$$t = \frac{1}{\text{Baud rate}}$$

Referring to Figure 3. 2, the first unit is always a SPACE level and serves as the Start bit. This is followed by the seven units of data bits (least significant bit first) and the single unit parity bit. The parity bit is always followed by one or two units of MARK level which serve as the Stop bit(s). The input to the Model DP-8000 used at 110 Baud (10 CPS) is always comprised of an eleven-unit code. IT IS UNDERSTOOD THAT INPUT DATA TO ALL PRINTERS USED AT ANY OF THE STANDARD BAUD RATES, OTHER THAN 110 BAUD, ARE NORMALLY COMPRISED OF TEN-UNIT CODES. All references in this Manual to character rate for these are based on the use of ten-unit codes. The input logic is capable of functioning properly with either ten- or eleven-unit codes without adjustment or modification, as long as the Baud rate remains as specified.

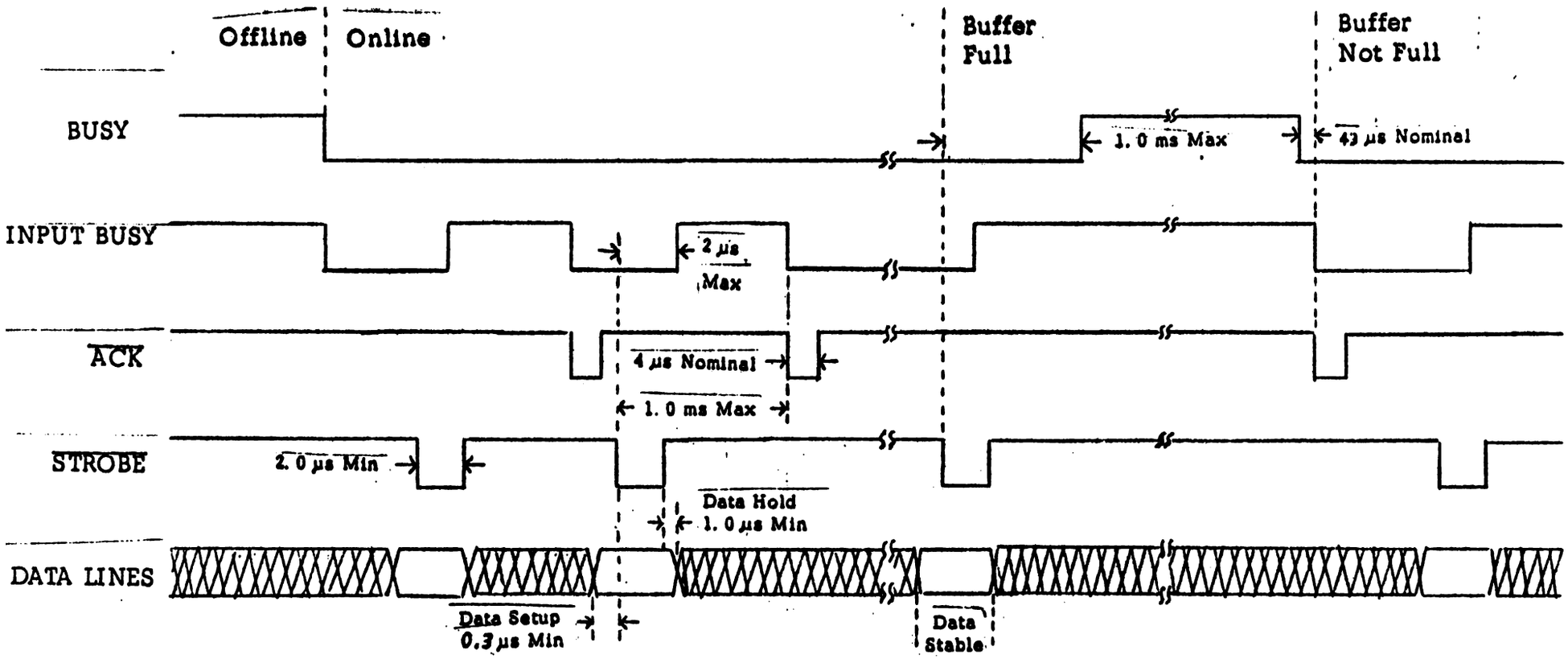
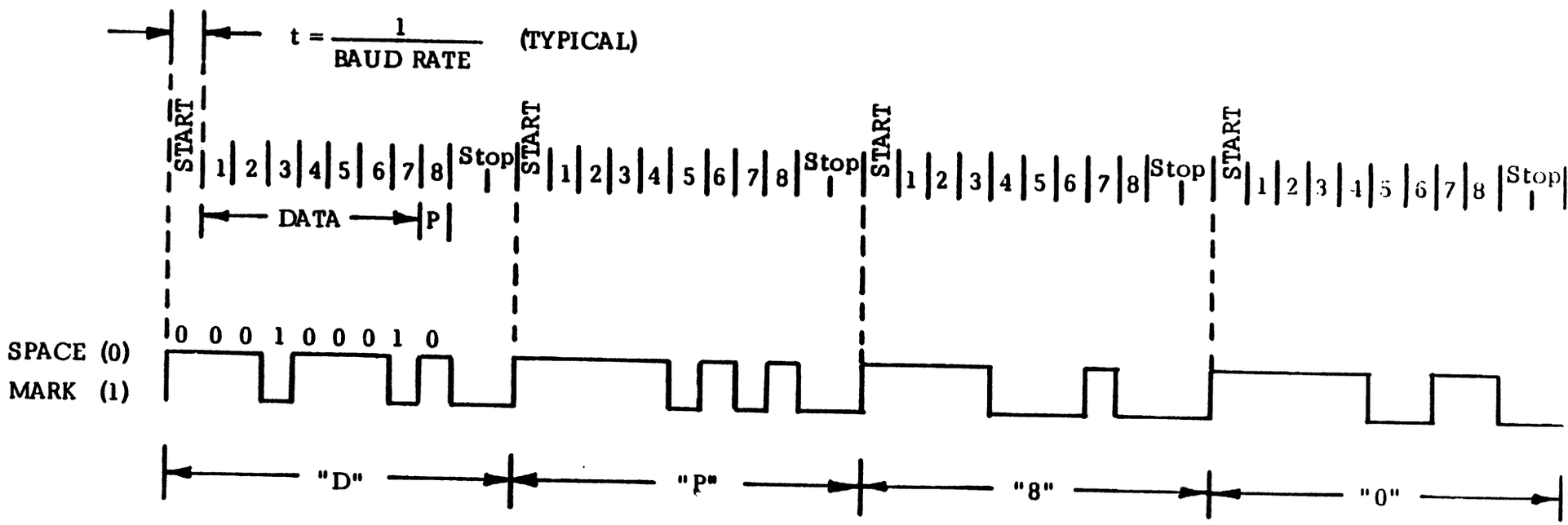


FIGURE 3.3

PARALLEL INTERFACE TIMING



INPUT BIT FORMAT--SERIAL INTERFACES

FIGURE 3. 2

3.3.1 RS232C Input/Output Logic Levels

This interface conforms to EIA Standard RS232C logic levels.

The following specifications apply for levels illustrated in Figure 3.2 (Input Bit Format). See Pin Connection Table 2.1 for interface signal connector pin designations.

EIA Data Input
SPACE level (Logic "0") +3 V min. to +25 V max.
MARK level (Logic "1") -3 V min. to -25 V max.

EIA Data Terminal Ready Output
An RS232C compatible Data Terminal Ready signal is generated by the Printer to indicate when input data can be accepted. Data Terminal Ready is normally at the SPACE level and switches to the MARK level whenever the Printer is not capable of accepting data. Factors causing this condition include printer OFF LINE, OUT OF PAPER, and input buffer storage register FULL. The Data TERMINAL READY Output Logic Levels are identical to those described above for the EIA Data Input.

3.3.2 Current Loop Input Logic Levels

The second serial interface of the DP-8000 is compatible with current source, drive systems. This input accommodates a MARK current (Logic "1") from less than 20 ma to more than 60 ma without modification or adjustment. The SPACE current (Logic "0") must be less than 5 ma nominal. The Printer input circuit utilizes an LED opto isolator device. Overload protection for up to 120 ma nominal is included. Input impedance is nonlinear, and the nominal IR drop across the two, input terminals ranges from about 1.7 V at 20 ma to about 2.2 V at 60 ma.

The opto isolator input circuit provides total isolation between internal logic and the data source. Internal logic is also isolated from GROUND (earth). Normally, only a twisted pair cable need be used between the output of the data source and the input of the Printer. Refer to the "Pin Connection Table" in Section 2 for polarity and pin assignments.

3.4 Parallel Interface

3.4.1 Input Data Format--Parallel Interface

Seven data bits, arranged in accordance with the ASCII Code detailed in Figure 3.1, are transferred in parallel (simultaneously) for each input character by the application of an externally generated DATA STROBE Signal. The eighth (parity) bit is normally ignored by the DP-8000 when input data is supplied via the parallel interface.

The Model DP-8000 Printer is intended to function in closed-loop applications where the discontinuous input data supplied by the source is controlled by the handshake signals generated in the Printer. Two types of handshake signals are available at the parallel interface connector of the DP-8000 Printer.

The signals "BUSY" and "ACKNOWLEDGE (N)" are used together to control the data flow. The signal "INPUT BUSY" is a single line that provides information similar to the other two combined.

When data is presented on the data inputs, the external equipment must provide a data available strobe signal to the data strobe input of the DP-8000 Printer. The data is accepted at the falling edge of the strobe signal. Within 2.0 μsec the "INPUT BUSY" Line will switch to its busy level. If the Printer can accept more data (the Data Buffer is not filled), the "INPUT BUSY" will return to its "Not Busy" level within 1 ms; simultaneously, the Printer will generate a negative-going pulse on the "ACKNOWLEDGE (N)" Line.

If the data just accepted caused the Storage Buffer to be "Full," the return or the "INPUT BUSY" Line to "Not Busy," and the "ACKNOWLEDGE" Pulse are delayed until the Printer finishes printing the next data line, making space available in the Storage Buffer. Also, the "BUSY" Line will go to its busy level within 1 ms after the last data strobe when the Buffer becomes full. It remains at the busy level until space is again available in the Buffer.

3. 4. 1 Input Data Format--Parallel Interface (Cont'd)

When power is initially applied to the DP-8000 Printer, "BUSY" and "INPUT BUSY" will both go to their busy levels. If the Printer is supplied with paper, it will go "ON LINE" and both busy signals will go to their "Not Busy" condition. If the Printer is not supplied with paper when power is applied, it will go to the "OFF LINE" condition, and the signals will remain busy.

When paper is inserted in the Printer and the operator presses the "ON LINE" Switch, the signals will go to the "Not Busy" levels. If the "Data Strobe Pulse" is applied while the Printer is indicating that it is busy, the data is not accepted nor acknowledged.

Data will be accepted continuously until the Storage Buffer is full, regardless or whether the DP-8000 is in printing operation or not. The typical, average maximum data rate accepted by the Parallel Interface of the DP-8000 is 1800 characters per second.

To summarize, data may be strobed into the DP-8000 whenever the "INPUT BUSY" Signal indicates "Not Busy"; or, the initial Data Strobe may occur if the "BUSY" Line indicates "Not Busy," and subsequent Data Strobes may occur upon receipt of the "ACKNOWLEDGE (N)" Pulse.

NOTE: The DP-8000 Printer is normally supplied connected to provide a "INPUT BUSY" Signal, i.e., a high output indicates "Busy." A jumper wire on the main circuit board can be repositioned to supply the opposite polarity. Another jumper can be altered to allow using a positive-going Data Strobe Pulse.

3.4.1 Parallel Input/Output Logic Levels

All data and handshake signals for the DP-8000 Printer Parallel Interface are compatible with standard DTL/TTL logic levels. The following descriptions and specifications apply for levels illustrated in Figure 3.3. See "Pin Connection Table 2.2" for interface signal connector pin designations.

All Logic "1" signal levels are standard +2.4 V minimum to +5.0 V maximum. Logic "0" levels are +0.4 V maximum with current sinking, as indicated below.

a. Data Lines, DB1 through DB8, (Input)
In standard models, data bits are positive "true" (Logic "1"). Logic "0" requires +0.4 V maximum with 3 ma nominal sink current.

b. $\overline{\text{Data Strobe}}$ (Input)
Logic "0" requires +0.4 V maximum with 2 ma nominal sink current.

c. $\overline{\text{Acknowledge}}$ (Output)
Logic "0" current sinking capacity is 6 ma nominal. Duration is 4 µs nominal.

d. BUSY (Output)
Logic "0" current sinking capacity is 6 ma nominal.

e. INPUT BUSY (Output)
Logic "0" current sinking capacity is 6 ma nominal.

3.5 Front Panel Controls and Indicators

POWER Switch and Indicator: Controls primary AC power to the Printer. When the switch is ON and power is applied, the integral POWER indicator glows. Refer to Section 3.6 for details of powerup initialization.

FEED Switch: When depressed, the Printer will feed one line, hesitate, and then continue feeding at ten lines per second as long as this switch is depressed until the Top of Form

position is reached. If it is desired to feed past this position, the switch must be released and then depressed again. NOTE: Operation of this switch is inhibited while the Printer is actively engaged in printing.

TOF SET Switch: Momentarily depressing this switch indicates to the Printer that the present position on the form should be considered the Top of Form position. Operation of this switch is inhibited while the Printer is actively engaged in printing. Refer to Section 3. 6 for details of Top of Form Set upon initialization.

ON LINE Switch and Indicator: Alternate depressions of this switch place the Printer ON/OFF LINE (Select/Deselect). The ON LINE indicator glows when the Printer is ON LINE. Operation of the switch is inhibited while the Printer is actively engaged in printing. The Printer is automatically placed OFF LINE if paper supply is exhausted. When OFF LINE, data buffer storage register is cleared, character print-width logic is reset to the Single-Width state, and the Printer indicates BUSY to the data source. Refer to Section 3. 6 for details of ON LINE state upon initialization.

3.6 Printer Initialization

Printer initialization is accomplished in one of two ways, as described below.

a. Initialization takes place automatically each time the primary AC power source is interrupted and reapplied.

b. Initialization may be initiated remotely by activating (TTL Logic "0") the Input Prime (J3-31) Pin of the Parallel Interface connector. This line should be driven by an open-collector TTL device or equivalent. The minimum reset pulse length is 3.0 µs. If this feature is not used, the input should be left unconnected.

Upon initialization, the following sequence of events occur:

a. The printhead is cycled to either side of the mechanism, unless it is already at the LEFT HOME position.

b. The Printer is automatically placed ON LINE, unless out of paper.

c. The printhead's present position on the form is assumed to be the Top-of-Form position.

d. Any stored Vertical Tab positions are cleared.

e. The data buffer storage register is cleared.

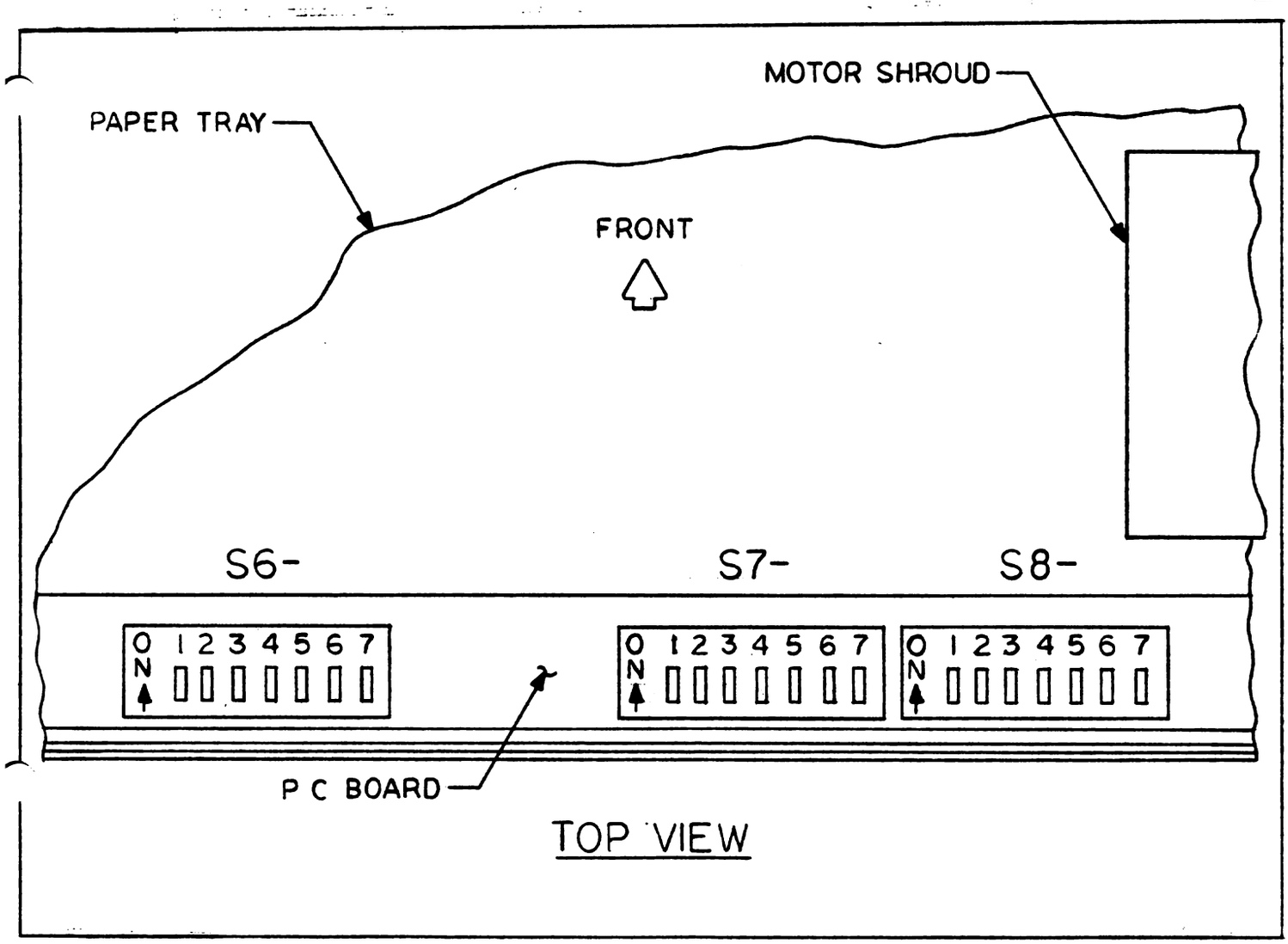
f. The character print-width logic is reset to the Single-Width state.

3.7 Internally Selectable Operating Features

A number of the Printer's operating features may be selected by miniature Dip-Switches, which are accessible by removing the top cover and the paper supply if the rear paper access slot is used. The following Table lists the function of each switch and shows its location.

NOTE: NOTE: NOTE: NOTE: NOTE:

PRIOR TO CHANGING THE POSITION OF ANY OF THE SWITCHES LISTED BELOW, THE POWER SWITCH MUST BE OFF OR THE A. C. SUPPLY DISCONNECTED. THIS IS IMPORTANT TO PREVENT POSSIBLE SHOCK HAZARD; BUT, ALSO, THE PRINTER'S LOGIC WILL NOT RECOGNIZE A SWITCH CHANGE UNLESS THE POWER HAS BEEN TURNED OFF--THEN ON, INITIALIZING THE INTERNAL MICROPROCESSOR LOGIC TO THE NEW FUNCTION SELECTED.



TOP VIEW

Anadex

APPLICATION NOTE NO. 010479

INTERFACING THE ANADEX MODEL DP-8000 PRINTER TO THE RADIO SHACK MODEL TRS-80 COMPUTER

The Anadex Model DP-8000 Printer may be connected directly to the parallel port of the TRS-80 Expansion Interface. This port, which was designed to drive a Centronics printer, is also compatible with the Anadex parallel interface. Connections are made using a one-to-one cable, exactly as though interfacing to the Centronics printer, with a single exception. The wire which would normally connect to pin number 11 (BUSY OUTPUT) of the Centronics printer should instead be connected to pin number 36 (INPUT BUSY) when using the Anadex Model DP-8000. This change is necessitated by the fact that the TRS-80 does not make use of the ACKNOWLEDGE signal (pin 10) and sends data to the printer essentially open loop, on a line-by-line basis.

DP-8000 Printers delivered from the factory prior to January 4, 1979 require an additional modification for proper operation with the TRS-80. The polarity of the INPUT BUSY (pin 36) signal was inverted in these printers. Proper polarity may be obtained by performing the following modification:

1. Unplug the ribbon cable, extending from the print head, from printed circuit board (forward, right hand corner).

2. Remove the three mounting screws securing the print mechanism and set the mechanism aside so that the top of the printed circuit board is visible

3. Locate the jumper wire labeled IBZ in Figure 1. and unsolder the right hand lead. Move this lead to the printed circuit pad located directly below the pad where it was originally installed and resolder. The jumper wire should now be installed as depicted in Figure 1.

Printers delivered subsequent to January 4, 1979 will already have this jumper wire located in the correct position.

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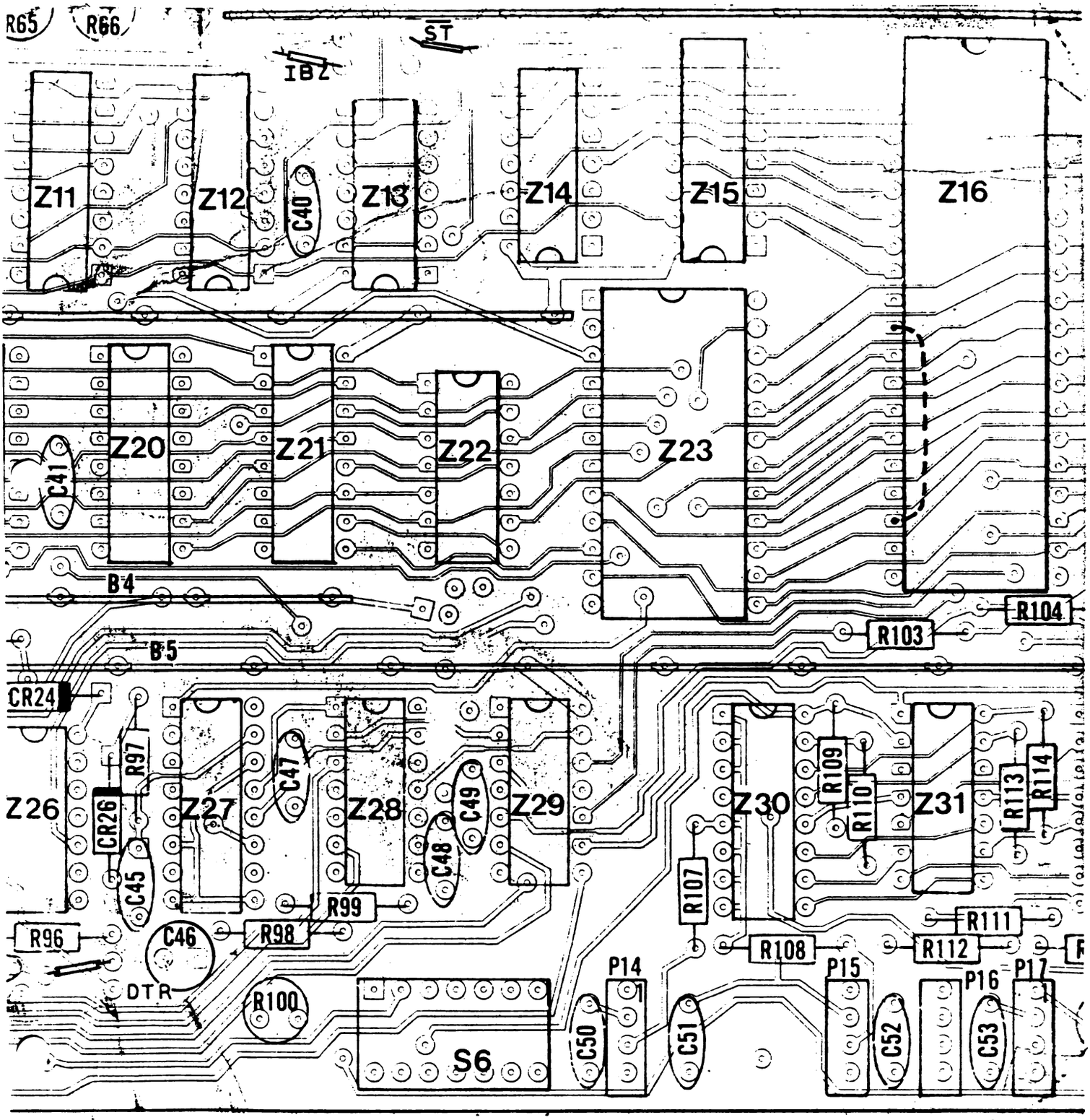
R65
R66
ST
IBZ
Z11
Z12
C40
Z13
Z14
Z15
Z16
Z20
Z21
Z22
Z23
C41
B4
B5
R104
R103
CR24
Z26
R97
CR26
C45
Z27
C47
Z28
C48
C49
Z29
Z30
R109
R110
Z31
R113
R114
R107
R99
R96
C46
R98
R111
R112
R108
P14
P15
P16
P17
DTR
R100
S6
C50
C51
C52
C53

FIGURE 1

A secondary problem has been noted in some TRS-80 Expansion Interfaces. The DATA STROBE Signal (pin 1) of the parallel port appears to vary in width, from unit to unit, down to a minimum of 1.5μs. Since the minimum width specification for this signal, in the Model DP-8000 is 2μs, a condition could exist where the printer may not function properly with these Interfaces. Should this problem be encountered, it will be necessary to widen the STROBE signal generated in the TRS-80 Expansion Interface. This may be easily accomplished by increasing the value of the capacitor associated with the SN74LS123N Integrated Circuit which generates this signal within the Interface.

PRIOR TO CHANGING ANY OF THE SWITCH POSITIONS, SEE "NOTE" IN SECTION 3.7

SWITCH FUNCTION TABLE

S6

	OFF Function	ON Function
-1	Serial Interface	Parallel Interface*
-2	EIA Interface	Current Loop Interface
-3	Ignore Parity	Check Parity (Serial Only)
-4	Odd Parity	Even Parity
-5		
-6	Baud Rate Selection	
-7	See Table at Right	

*When Parallel Interface is selected, S6-3 thru S6-7 must be placed in the "OFF" position.

S6

BAUD RATE	-5	-6	-7
110	OFF	OFF	OFF
150	OFF	OFF	ON
300	OFF	ON	OFF
600	OFF	ON	ON
1200	ON	OFF	OFF
2400	ON	OFF	ON
4800	ON	ON	OFF
9600	ON	ON	ON

S7

	OFF Function	ON Function	
-1	OFF	0.5"	Form Length Switches in inches. Switch values are additive.
-2	OFF	1 "	
-3	OFF	2 "	
-4 } = 12"	OFF	4 "	
-5	OFF	8 "	
-6	--------SPARE SWITCH--------		
-7	--------SPARE SWITCH--------		

S8

	OFF Function	ON Function	
-1	OFF	1 Line	Skip over perforation distance in Lines. Switch values are additive.
-2	OFF	2 Lines	
-3	OFF	4 Lines	
-4	OFF	8 Lines	
-5	Print on CR code only.	Print on CR or any paper movement command (Auto LF with CR).	
-6	Truncate excess over 80 columns per line	Wraparound--print excess over 80 columns per line on next line.	
-7	--------SPARE SWITCH--------		

IV OPERATOR MAINTENANCE

4.1 Preventative Maintenance

Preventative Maintenance for the Model DP-8000 Printer consists entirely of cleaning on a regular basis. The Printer should be cleaned with a soft brush or low-pressure air source to remove paper dust and chaff after every three months of use. Exterior surfaces may be cleaned by using a mild detergent and water solution.

4.2 Troubleshooting

Due to the complex nature of the state of the art circuitry utilized in the Model DP-8000 Printer, operator troubleshooting must logically be limited to a few easily recognizable symptoms and cures. Should a Printer malfunction (which is not covered in this Section) occur, the operator should refer the problem to the nearest Anadex Authorized Service Center listed in Section V of this Manual.

SYMPTOM	POSSIBLE TROUBLE AREA
Printer inoperative, Power Indicator NOT illuminated.	Rear Panel AC power fuse. Replace with a 3AG, 1.5 ASB for 115 VAC operation or a 3AG, 3/4 ASB for 230 VAC operation. If symptom persists, refer to Section V.
Printer inoperative, Power Indicator IS illuminated. Paper Advance DOES function.	Check for Out of Paper or Printer OFF LINE condition. Rectify as appropriate.
Printer inoperative, Power Indicator IS illuminated. Paper Advance DOES NOT function.	Internal fuse located on circuit board to right of print mechanism. Replace with an 8AG, 4A fuse. If symptom persists, refer to Section V.

V ANADEX AUTHORIZED SERVICE CENTERS

The following is a complete listing of all Anadex Authorized Service Centers worldwide. These centers are complete repair facilities and are authorized to perform both Warranty and Non-Warranty repairs for the Model DP-8000 Printer.

	Telephone
Pat Jenks Associates 607 North Ave., Door #16 Wakefield, MA 01880	617-246-1590
Technical Marketing Associates 2460 Lemoine Ave. Fort Lee, NJ 07024	201-224-6911
Electronic Marketing Associates 11716 Parklawn Dr. Rockville, MD 20852	301-881-5300
Electronic Marketing Associates 210 Goddard Blvd. King of Prussia, PA 19406	215-265-1600
Carter, McCormic & Peirce, Inc. 23995 Freeway Park Dr. Farmington, MI 48024	313-477-7700
Ossmann Instruments, Inc. 6666 Old Collamer Rd. E. Syracuse, NY 13057	315-437-6666
Pivan Engineering Co. 3535 W. Peterson Ave. Chicago, IL 60659	312-539-4838
Barnhill Three, Inc. 1980 So. Quebec St., Unit 4 Denver, CO 80231	303-750-1222

V ANADEX AUTHORIZED SERVICE CENTERS (Cont'd)

Basic Systems 230 W. Florence Ave. Inglewood, CA 90301	213-673-4300
Anadex, Inc. 9825 De Soto Ave. Chatsworth, CA 91311	213-998-8010
Anadex, Ltd. Dorna House, Guildford Rd West End, Woking, Surrey England	Chobham (099 05) 6333

WARRANTY POLICY

Anadex

Unless otherwise stated, ANADEX, INC. warrants the Model DP-8000 Printer to be free from defects in material and workmanship and to perform in accordance with applicable specifications for 90 days from date of shipment.

ANADEX, INC. will provide free service, including parts, labor, and transportation back to the customer for any malfunction of its products which, upon authorization from ANADEX, are returned to any of the ANADEX Authorized Service Centers transportation charges prepaid. A complete description of the reason for return must accompany the unit. A nominal handling charge will be made on units for which a rejection is not verified.

This warranty is void if the product is subjected to misuse, neglect, accident, or improper installation or application.

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